7th Annual DAIRY GOATS Conference

PROCEEDINGS

November 17-18, 1984

Agricultural Extension Service
University of Minnesota

DAIRY GOAT CONFERENCE
SATURDAY, November 17

a.m.	
7:45	Registration
8:00	Dairy Goat films for those arriving early
8:55	Welcome *Vince Maefsky*
9:00	How Not to Raise Dairy Goats— *Christine Williams*
10:15	Break
10:30	Potential Hazards to Human Health in Goat Husbandry— *Ashley Robinson*
11:10	Induced Parturition (to Control CAE) *Christine Williams*
p.m.	
12:00	Lunch (on your own — food available at Student Center)
1:00-3:00	Concurrent Sessions
1:00-3:00	A. Cheese Making—*Marge Kitchen*
1:00-2:00	B. Tour: Vet. Hospital and Clinic
2:00-3:00	B. Tour: Vet. Hospital and Clinic
1:00-2:00	C. D.H.I.—*Gerald Steuernagel*
2:00-3:00	C. Marketing—*Vincent Maefsky*
1:00-2:00	D. Basic Management—*Mark Boorsma*
2:00-3:00	D. Basic Management—*Maxine Sheldon*
3:15	Update on Dairy Goat Health Problems in Minnesota *Dave Sherman*
3:45	Wrap-up and Question the Experts *Robinson, Sherman, Williams*
4:30	Adjourn

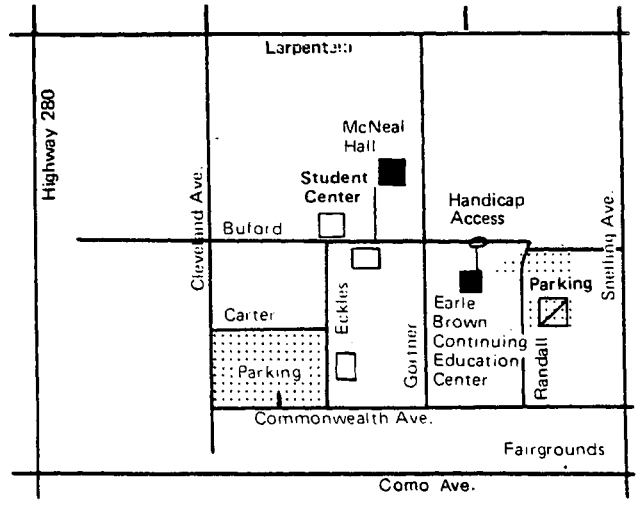
SUNDAY, November 18
8:30 a.m.-4:30 p.m.
Pre-judges Training Conference for special interest persons — Wilder Forest
14184 Ostlund Trail North
Marine on St. Croix

Who is presenting this course:

†* *Robert Appleman,* Extension dairyman
Mark Boorsma, V.P., MDGA, teacher and goat breeder, Chaska
Harvey Considine, licensed judge, international lecturer, author, dairy goat herd owner, Portage, Wisconsin
† *Marge Kitchen,* MDGA, Grande
† *Vince Maefsky,* MDGA director, Poplar Hill Goat Dairy, Scandia
* *Ashley Robinson,* DVM professor Large Animal Clinical Sciences, College of Veterinary Medicine
Maxine Sheldon, MDGA, Marine on St. Croix
†* *Dave Sherman,* DVM, assistant professor, Large Animal Clinical Science, College of Veterinary Medicine
* *Gerald Steuernagel,* extension dairyman DHI Systems
†* *Gerald Wagner,* extension specialist, Program Development
Christine Williams, DVM, professor of Pathology and director of Laboratory Animal Care Service, Michigan State University, East Lansing

**University of Minnesota*
†*Planning Committee*

Sponsored by University of Minnesota:
Office of Special Programs, Agricultural Extension Service, College of Veterinary Medicine, Department of Animal Science in cooperation with the Minnesota Dairy Goat Association
For more information call (612) 373-0725



7TH ANNUAL DAIRY GOAT CONFERENCE

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In favor of health	Against health
Barn enclosures, fences and feeders are efficient, reliable, and easy to operate (this does not mean expensive).	Buildings and equipment are not reliable, so that goats are always getting out, getting into the wrong places and wasting time and patience.
Keep barn dry and well ventilated.	Keep barn damp and/or tightly closed, warm and poorly ventilated.
Keep goat trading to a minimum and quarantine new arrivals.	Buy and sell goats all the time and mix them straight away.
Keep showing to a minimum.	Show your goats at every opportunity.
Keep goats that are able to eat enough in a group situation, to satisfy production needs.	Keep goats that have to be hand fed individually in order to survive in a herd situation.
Feed your animals as ruminants.	Feed them as non-ruminants, on high concentrate rations.
Preventive medicine program.	Fire-engine emergency treatment of sick goats.
Raise kids in separate age groups, preferably outside, in moveable pens on new ground every time.	Raise kids of all ages in same kid pen in the barn, or let kids run with does in a small overgrazed paddock.
Enough time to do all your preventive care, and then some time left over to sit down and enjoy your goats.	Too many goats and not enough time to look after them properly.

Williams' Golden Rules of Goatkeeping

1) Beginners luck is legendary but it won't last.

2) The more you pay for a goat, the more likely it is to die a spectacular early death.

3) The further away you get it from, the more troubles you will have with it, and the less likely you will get rid of it.

4) If you can't stand a few dead goats, especially expensive ones, don't start keeping goats in the first place.

5) If your goat numbers go from 5 to 50, your goat problems do not increase ten-fold, they increase 20-30 times or more.

POTENTIAL HAZARDS TO HUMAN HEALTH IN GOAT HUSBANDRY

Dr. Ashley Robinson
Department of Large Animal Clinical Sciences
College of Veterinary Medicine
University of Minnesota, St. Paul

Goat ownership in the USA is increasing as evidenced by the number of new people interested in keeping these animals for food, companionship and sometimes even economic gain. However, new owners may lack prior experience, and the question often arises, particularly where young children are involved, as to the safety of these animals and their products. At the outset let me state that I believe that goats are an admirable companion animal particularly to introduce youngsters as to where some of their daily food ultimately comes from. Nevertheless, there are some health issues that should be discussed so that you, as goat owners, are fully aware of the risks of illness in humans that can occur if animals are not subject to regular health care.

Firstly let us review the term zoonosis. This is defined by the World Health Organization as "those diseases and infections which are naturally transmitted between vertebrate animals and man." We subdivide these infections into (a) those that can be transmitted directly from animals to humans and (b) those transmitted indirectly via another host, vector, or products such as meat and milk. Finally there may be some instances where goats and people may be infected from a common source in which the goat plays no role in transmission but may serve as an "indicator" of potential problems.

I would like to stress that some zoonotic conditions exist in animals in a subclinical form without showing any obvious signs. Thus one cannot guarantee that because there are no illnesses there are no problems.

Unfortunately we have no accurate database to state how many of the following caprine diseases I am going to discuss actually have caused illness in humans. My information is primarily derived from published reports in the medical literature and personal communications or observations.

ZOONOSES TRANSMITTED DIRECTLY FROM GOATS TO HUMANS

Contagious Ecythma (Orf, Soremouth)

This virus condition is widespread among both goats and sheep. It is caused by a very persistent pox virus that causes scab-like lesions on the gums, tongue, nostrils, eyelids, teats and even feet. Although few animals die from contagious ecythma, severely affected kids often lose weight due to difficulty in eating. The virus lives for long periods in the scab material that falls off during the healing phase so that once the infection is introduced onto a property, regular vaccination is usually advised, preferably under

the tail or inside the ear. Humans become infected in two ways: either directly from an infected goat, say by putting one's hands in their mouth or through accidental contamination of the hands with the vaccine. Thus wearing of gloves is recommended during this latter procedure. The lesions in humans are usually single, on the hands, wrist or forearms, are very painful, but regress in four to six weeks. Lesions should be covered, antibiotics used to control infection, and care taken to avoid transferring virus to the lips or mouth.

Ringworm

This fungal infection does occur very occasionally in goats, who themselves may have been infected from cattle. Circular hairless areas are seen on ears, head, and neck. Iodine shampoos, or other fungicidal ointments usually clear the condition rapidly, and persons working with the infected goats should wash up carefully following contact.

Rabies

Minnesota unfortunately has one of the highest prevalence of skunk rabies in the USA, and while cattle are the most common animals affected (twenty to forty annually), each year one or two goats are exposed to rabid skunks and die. If a goat is exposed to a known rabid skunk, the safest course is to euthanize the animal. Otherwise it should be quarantined under observation for six months to allow for signs to develop. These include sexual excitement, attacking humans or other animals, sudden falling, tremors, and salivation.

There is a vaccine now available for the vaccination of valuable goats. To the best of my knowledge no person has ever died in the USA following exposure to a rabid goat, but if by any chance a person is exposed, there is also available an effective and safe (but costly) vaccine.

Pseudorabies is an infectious disease of swine which is causing very serious concern in Minnesota. Signs are very similar to rabies, and we have seen at least one goat in our clinic develop this rapidly fatal disease. It is not transmissible to humans, but I would not advise keeping goats and swine together unless the swine herd is known to be free of infection.

Listeriosis

This is a bacterial disease that occurs occasionally in goats, as well as sheep and cattle. Usually it is seen as animals presenting with nervous signs, especially circling, although others may only abort. The disease is almost always fatal. Listeriosis occurs in humans also, and pregnant women are at especial risk. Veterinary confirmation of this disease is required. Corn silage is a known risk factor, and antibiotics in the feed may help to reduce the risks.

Pseudotuberculosis

This bacterial disease occurs widely in the goat population and also in sheep. External or internal abscesses are seen in affected animals. While I am unaware of any human cases acquired from goats, there are several reports in the Australian literature of sheep shearers developing abscesses caused by this bacterium.

Cryptosporidiosis

This protozoan parasite is evolving as a very significant cause of diarrhea in young kids. It can also cause severe diarrhea and abdominal cramps in people in close contact with these animals. Unfortunately we do not have any very effective drugs against this parasite so that scrupulous attention to personal hygiene is required when dealing with animals with signs of diarrhea.

"Q" Fever

Both goats and sheep in the USA show a relatively high level of infection with the organism Coxiella burneti which may only be manifested by abortion. Clinically healthy animals can shed the organism at kidding or in the milk so that again careful attention to personal and food hygiene is necessary. Always dispose of afterbirths or aborted kids carefully, and I would encourage you to get a laboratory diagnosis of the cause wherever possible.

ZOONOSES TRANSMITTED INDIRECTLY BETWEEN GOATS AND HUMANS

For the remainder of my talk I want to concentrate on milk borne disease agents as these are the ones that personally give me the most problems: i.e. the consumption of raw milk. I have no doubt that proportionately more goats' milk than cows' milk is consumed raw: i.e. without any form of heat treatment. I am fully aware that numerous reasons have been advanced as to why raw milk is a better product than pastuerized milk, but my own evaluation of the scientific data is that, particularly for infants, young children, the elderly, and those individuals with some underlying illness, raw milk can pose some very real threats. Many of you are probably aware of the ongoing epidemic of human illness in Brainerd, Minnesota, associated with the consumption of raw cows' milk. Furthermore the Food and Drug Administration in Washington is currently holding public hearings to determine whether raw milk poses significant health hazards, whether pasteurization is the best method to control any hazards and also whether controls on raw milk sales should be lifted. Pressure for this has come to a large extent from advocates of so-called "certified" raw milk. My personal opinion that with the rapid increase in outbreaks of diarrheal disease due to raw milk consumption, the image of dairy products as safe and nutritious may well be damaged if this trend continues.

Let us review what is meant when we say goats' milk should be of good hygienic quality.

a. It should be produced under conditions which satisfy the esthetic requirements of any food producing process: i.e. clean surroundings, visibly clean udders, teats, and equipment.
b. Visible dirt and extraneous matter are kept out of the milk and not cleaned up by filtration which is only a safeguard against accidental contamination.
c. The milk is of good keeping quality: i.e. contamination with "spoilage" bacteria is minimal.
d. It is free from antibiotics, preservatives, sanitizer residues, and pesticides.
e. Risks of contamination of the milk with microorganisms pathogenic to humans are minimized.

This last section contains the concerns most important to Public Health.

There are two diseases--viz. Tuberculosis and Brucellosis--which historically have been transmitted to humans primarily via cows' milk. In the USA, goats have shown an extremely low rate of reactors to tests for Brucellosis and Tuberculosis. The Minnesota Board of Animal Health has specific voluntary regulations which provide for the testing and mandatory quarantine in the case of any reactors. To date no infected goat herds have been identified under this program.

Unfortunately, Brucellosis and Tuberculosis are the only two milk borne diseases for which we have accurate tests available to say with confidence that individual animals and herds are free of infection. The other major milk borne diseases such as:

Salmonellosis
Campylobacteriosis
Yersiniosis
Coxiella burneti ("Q" Fever)
Toxoplasmosis

cannot readily be identified on herd tests nor can tested animals be regarded as free of infection subsequent to the test.

The majority of these agents do not produce active signs of mastitis so the milk may appear normal. Some agents may enter the milk from contamination of the teats or udder with fecal material. All are readily inactivated by pasteurization and I strongly recommend that this be carried out. A simple method is attached to this paper.

Cheese made from raw goats' milk is usually considered safe providing it has been aged for at least sixty days. Home-made icecream has been incriminated in disease outbreaks, and it is recommended that both pasteurized milk and egg products be used.

Finally, goats, because of their browsing activity, may ingest plants which have toxic principles. A good example is white snakeroot which contains tremetol. This alcohol causes "milk sickness" in humans. There are also reports from California of congenital deformities in babies as a result of their mothers drinking goats' milk during pregnancy which may have contained

material from toxic plants. Also mouldy feeds may contain a potent toxin called aflatoxin which is passed into the milk. None of these toxic materials can of course be eliminated by pastuerization, but rather by care and attention to the diet of animals.

Chevon and lamb enjoy an excellent reputation as being safe products, particularly when compared to poultry, pork and beef. Nevertheless, I would avoid eating either meat undercooked primarily because of the risk of acquiring toxoplasmosis, a parasite spread by cats.

INJURIES FROM GOATS

Goats as a general rule do not bite, strike, or kick; however, they do use their heads for butting, and those with horns may use them as battering rams. A male goat is much more likely to initiate an attack than is a male sheep. Dehorning obviously reduces the risk dramatically of horn injuries, but remember even a polled animal can cause a serious injury particularly if the person is caught unawares. Highly excited goats have been known to attempt to jump over a person and four feet on your chest or head is no laughing matter.

Remember it is not necessary to cast a goat to trim its feet: legs can be lifted as one would with a horse. Back injuries are very common among those persons working with sheep and goats. If you have to lift an animal over a fence or onto a vehicle, keep your back straight when lifting. Use your legs to lift - bend your knees. Lift smoothly and continuously and know your limits: i.e. get help if necessary. When vaccinating or injecting goats, remember to have the animals well-restrained and keep your hands behind the needle so you will not accidentally self-inject yourself or assistant.

SUMMARY

Historically the risk of human diseases being acquired either directly or indirectly from goats is low. Nevertheless owners and their families should be aware of certain zoonotic diseases manifested by skin lesions (contagious ecythma), nervous signs (rabies or listerosis), abortion (Q Fever or Campylobacter), or diarrhea (Salmonellosis or Cryptosporidiosis), and seek qualified veterinary diagnosis. Raw goats' milk may contain human pathogens without the animals showing obvious signs of disease nor can veterinary tests eliminate all infected animals. Pasteurization therefore is strongly recommended. A high standard of personal and animal hygiene is recommended to prevent unnecessary transfer of infection.

Fact Sheet

Milk Pasteurization

FOR THE FAMILY FARMER

Issued by—
United States Department of Agriculture

Agricultural Fact Sheet Number 57, Written by P.W. Smith, USDA

Milk Pasteurization on the Small Farm or in the Home

Milk is a natural liquid food. It is one of our most nutritionally complete foods, adding high-quality protein, fat, milk sugar, essential minerals, and vitamins to the diet. Since prehistoric times, we have used milk in many ways: to drink; to churn into butter; to make into cheeses and cultured products, such as yogurt[1] and buttermilk; and to combine with other ingredients to make frozen desserts, candy, and baked goods.

Guarding Against Disease

Milk contains bacteria and, when improperly handled, provides an excellent medium in which bacteria can multiply. Most of the bacteria in fresh milk from a healthy animal are either harmless or beneficial. However, rapid changes in the health of an animal or of the milk handler, or contaminants from polluted water, dirt, manure, vermin, air, cuts, and wounds can make raw milk potentially dangerous.

Bacteria contaminating raw milk have been linked to numerous outbreaks of typhoid fever, diphtheria, septic sore throat, scarlet fever, dysentery, Q-fever, gastroenteritis, and food poisoning in the United States. Other diseases, including tuberculosis and undulant fever (brucellosis), may be transmitted to human beings in raw milk from diseased animals.

Many farm families regularly drink raw milk without any ill effects and, perhaps over a period of time, they have built up body immunities to many milkborne diseases. However, guests or public customers who consume raw milk could be exposed to unnecessary or extremely costly risks for which a milk producer could be held liable. To reduce these risks, the U.S. Department of Agriculture (USDA) recommends the pasteurization of milk for home and market use. Milk offered for sale may be subject to regulation by local and State authorities, and a permit to sell milk may be required by these authorities.

Pasteurization, named for Louis Pasteur (who first developed the process for other foods), is a moderate but exact heat treatment of milk which will kill bacteria

Figure 1—You can make quick and easy work of pasteurizing milk by using a double boiler. (A-1233-113)

[1] "How to Make Yogurt," U.S. Department of Agriculture, CA-NE-9, 1975.

that produce disease and will retard spoilage in milk. This process makes milk safe to drink and increases its storage life. Pasteurization does not involve complete sterilization, and milk may become contaminated after pasteurization. Rapid cooling, sanitary handling, and storage in a closed container at 40°F (4°C) or less will minimize contamination and spoilage problems.

Pasteurization and Handling Requirements

The requirements for proper pasteurization and handling of milk are—

- A potable water supply and proper dispensing system to avoid contamination.
- Clean and healthy animals, clean hands, and clean utensils.
- Rapid cooling, cold storage, proper pasteurization, and clean cold storage of pasteurized milk.

Potable Water Supply—A pure hot and cold water supply of adequate amount is necessary for good health and milk production of the animals, proper cleanliness of milk handlers and animals, and proper cleaning and sanitizing of utensils used in milking, pasteurization, and storage of milk. The water supply should be tested by an approved laboratory twice a year or any time after a system is modified or exposed to contaminants. A periodic inspection should be made to ensure that no cross connection or leak in the system exists where contaminated water can siphon back into the system by a pressure drop when a faucet is opened in the system.

Clean and Healthy Animals, Clean Hands, and Clean Utensils—Animals should be clipped regularly around the flanks and udder to keep long hair from collecting dirt. Milkers should wash their hands and the udder with clean water or an approved germicidal solution before they begin milking. Milk from diseased animals or those under antibiotic treatment **must not** be used.

The milking pail should be properly cleaned and have a small top opening to reduce the chance of contamination by manure or airborne contaminants. Prompt rinsing and washing of dirty utensils are easier and more effective than cleaning utensils on which dirt has been allowed to dry. Stainless steel utensils are preferred since they are durable and easy to clean.

Cooling and Storage—Prompt cooling of milk to 40°F (4°C) or less and storage at that temperature in a closed container, before and after pasteurization, is essential to maintain the quality and flavor of the milk. Care should be taken not to transfer barnyard dirt from the bottom or sides of the storage container to the countertop or to utensils in the kitchen or pasteurization area.

Milk from a milking should not be mixed with cooled milk from a previous milking unless you plan to pasteurize the mixture immediately.

How to Pasteurize Milk

Milk must be heated, with agitation, in such a way that every particle of the milk, including the foam, receives a minimum heat treatment of 145° F (63° C) continuously for 30 minutes or 161° F (72° C) for 15 seconds. The temperature is monitored with an accurate metal or protected glass thermometer. It is common practice commercially to use a high-temperature, short-time process in which the milk is heated to 170° F (77° C) for 15 seconds and then cooled immediately to below 40° F (4° C) to increase storage life without any noticeable flavor changes in the milk.

Pasteurization of fluid milk requires very specific amounts of time and temperatures. The procedure is as follows:

Temperature-Time Pasteurization Requirements for Fluid Milk

Temperature	*Time*
• 145° F (63° C) (vat pasteurization)	30 minutes
• 161° F (72° C) (high temperature, short-time pasteurization)	15 seconds
• 191° F (89° C)	1 second
• 212° F (100° C)	0.01 second

A good compromise for home pasteurization is to heat the milk to 165° F (74° C) in a double boiler and to hold it at this temperature for 15 seconds while stirring constantly. Then cool it immediately, while stirring, to below 145° F (63° C) by setting the top of the double boiler in cold water. Add ice to the cooling water to cool the milk further, stirring occasionally until the temperature of the milk falls below 40° F (4° C). Store the cooled milk in clean, covered containers and keep it at a temperature below 40° F (4° C) until used. This method is preferred over the one in which the milk is held at 145° F (63° C) for 30 minutes because if at any time during the 30-minute period the temperatue drops below 145° F (63° C), the milk must be reheated for 30 minutes. Milk may also be pasteurized at 145° F (63° C) for 30 minutes in jars in a waterbath canner, provided care is taken to maintain the temperature and the milk is cooled promptly to 40° F (4° C) or less.

Any thermometer, stirring device, or other object placed in contact with the milk must not be removed at any time during the entire pasteurization process. These objects contain unpasteurized milk and, if they are removed and then replaced in the container, they will contaminate the milk.

Electric batch-type home pasteurizers with a capacity of 2 gallons (7.6 liters) or more can be bought from supply houses. As little as 2 quarts (1.9 liters) may be pasteurized in these units. When they are operated

acording to manufacturers' directions, proper pasteurization will require little attention.

Proper pasteurization and handling will greatly increase the storage life of milk and will inactivate certain enzymes responsible for rancidity. However, pasteurized milk has not received sufficient heat treatment to improve baking qualities in recipes calling for scalded milk.

Milk for Cheese and Yogurt Making

Cheese and yogurt are fermented milk products that cannot be made unless the milk is of good quality and fermentation can be controlled. Cleanliness and careful handling of the milk are just as important in making cheese and yogurt as in preparing milk to drink. Pasteurization will kill any harmful bacteria and undesirable bacteria, such as those that produce gas or off-flavors in cheese. At the same time, beneficial bacteria that are needed to produce lactic acid during the making of cheese or yogurt are also killed, so a starter culture of bacteria that produces latic acid must be added to the pasteurized milk.

It is essential to use pasteurized milk in preparing proper starter culture in making cheese and yogurt. Complete directions for making cottage cheese, American-type cheese, and yogurt in the home may be obtained from USDA.

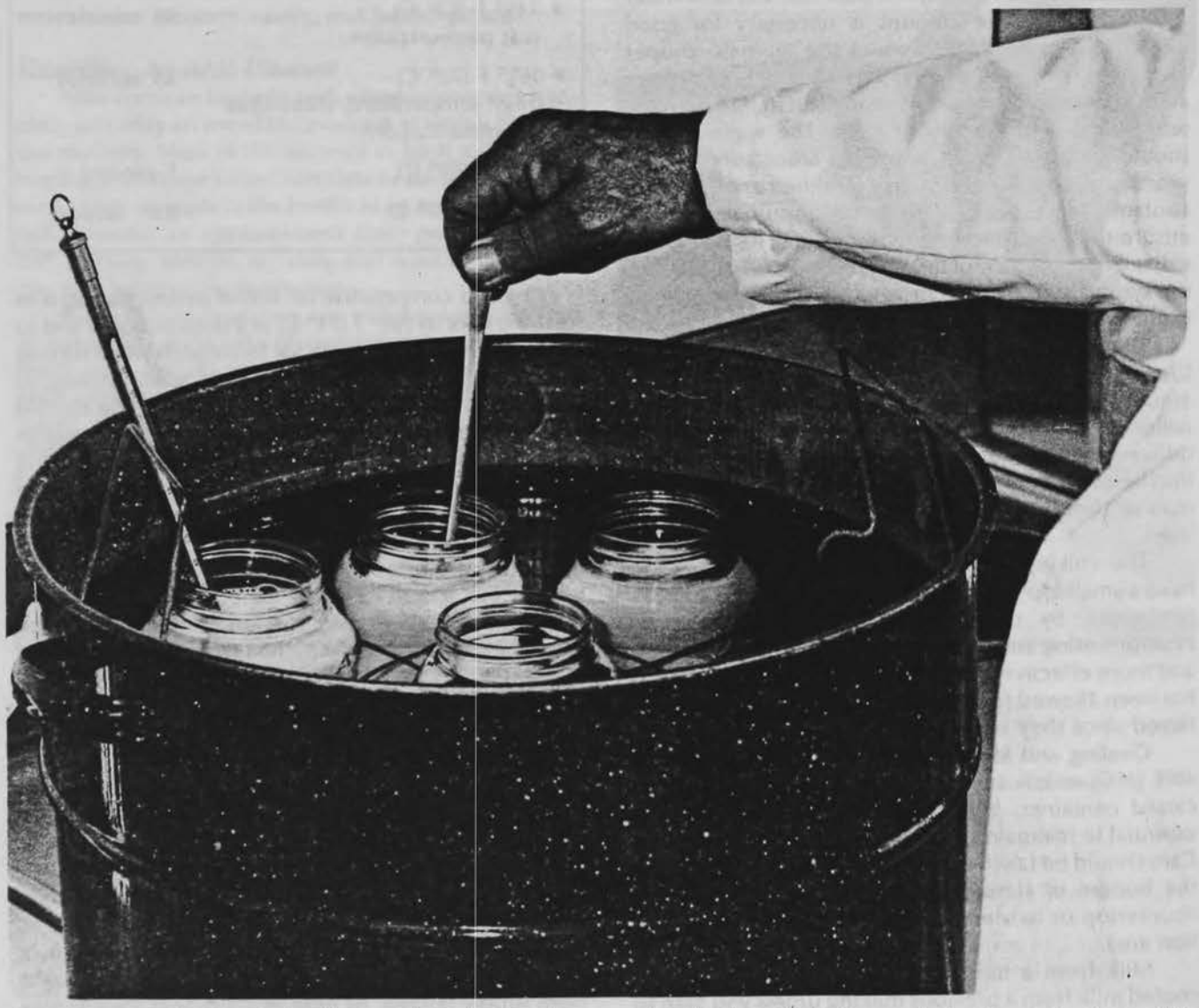

Figure 2—Using canning jars, placed on a rack inside of a large pot, is a handy method of pasteurization. You must make sure that the water level in the pot is above the water level of the milk in the jars. (A-1233-112)

INDUCED PARTURITION (to control CAE)

Christine Williams

Induced Parturition

Better living through modern chemistry - Why would anyone want to do it?

- CAE is a serious problem for those herds that have clinical disease.
- CAE control involves keeping kids away from sources of CAE virus, most likely being colostrum and milk. Vaginal secretions and saliva are probably not as important..
- How do you keep newborn kids away from colostrum? A jacket on doe? A T shirt? Teat tape? Or being there when the kid is born? This is the best way.
- Apart from CAE control - convenience is an important factor - with luck kids can be born in the afternoon on a weekend.
- Doe and kid survival is improved.
- Dystocias can be corrected early.

Drawbacks

- Prostaglandins ("Lutalyse" or "Estrumate") should not be handled by people prone to asthma or respiratory allergies. Pregnant women should avoid contact with the drugs.
- These drugs can abort goats, so if you are wrong in your timing, you could cause an abortion instead of a delivery.
- You must not use it if you ran a buck with the presumed pregnant does. If one came back in heat and it was bred, you will abort it if you inject based on the original breeding.
- Don't do it if your buck gets out occasionally. Bucks don't get out for a change of scenery. They get out because somebody is in heat.

How to do it

- Keep buck under control.

- Get out the calendar and figure those weekends you don't want kids to be born. Count back 147 days and don't breed goats on that weekend, or 3-4 days after it.
- Consult with your veterinarian and explain what you are intending to do, and arrange for availability of prostaglandin.
- Breed your goats and keep accurate records. For added assurance, buy some Probe-Tek Goat Pregnancy test kits, and mail in the milk samples when the goats reach 50 days after breeding. Now you know the goat is definitely pregnant with a live baby (this test can tell the difference between a real pregnancy and a false one). Inject your goat with prostaglandin about 30 hours before you are ready for delivery. That means that if you inject at morning chores, you will probably get kids born tomorrow afternoon. The earliest I have ever injected is day 142, with kids being born on day 143. Average gestation is 150 days, and I have not seen any problems with kids being delivered up to 1 week early. Injecting early means that most goats will not deliver ahead of your schedule. Most of the time I inject on 144 or 145. If you are really ambitious, you inject a week's worth of goats on Friday morning, and stand by to deliver kids Saturday afternoon!

  Important - do not put goats in kidding pens, and don't hang around watching them with cameras, etc.

Dose rate - 1 cc of Lutalyse or 1/4 or 1/2 cc Estrumate

Results

Unless the goat is already in labor when you inject, you are not likely to get kids before 27 hours with Estrumate and 29 hours with Lutalyse. There will be a lot of births between 30 and 35 hours and from then on they will string out.

If a goat hasn't delivered in 60 hours, she is going to deliver on her own when she is ready. There are a few goats that cannot be convinced to deliver when you want them to.

Conclusion

Those people who are well organized and in control will like this technique so much that they'll never go back to the "natural way." If you're not in control, please don't try it.

MAKING CHEESE AT HOME By Marjorie Kitchen

Legends tell us that cheese was first made many centuries before Christ and many countries try to claim they were the first to make cheese, but regardless of who was first to make it, cheese is a mainstay in the diet of many nationalities in the world.

Cheese making can be an involved art or can be done very simple on the back of your wood stove.

I have found that batches of cheese can vary tremendously, as with bread making or wine making. This is all becasuse of the fermentation processing. This is what makes it exciting to discover how each batch turns out.

BASIC STEPS IN THE MANUFACTURE OF CHEESE

The primary requirement for making cheese is a good supply of milk. The milk should be fresh, clean, and pasteurized. It is essential that the milk come from healthy animals. Pasteurization is necessary to destroy bacteria that would cause disease or that might cause undesirable fermentation and flavors in the cheese.

EQUIPMENT NEEDED:

1. All utensils that come in contact with the milk should be made of glass, stainless steel, or enamel-lined.

2. All utensils must be carefully cleaned before and after cheesemaking. (Most home cheesemaking failures are caused by unclean or unsteril equipment).

3. Glass or stainless steel measuring cup and spoons.

4. Dairy thermometer. The temperature sshould measure from 20 to 220 F.

There are two types of thermometers,one is a floating glass and the other is a stainless steel dial thermometer.
5. Pots. They should be stainless steel, glass or enamel-lines and large enough to hold the amount of milk you will use.

6. Additional Pot. You'll need a pot larger than the one that contained the milk to hold water and act as a

double boiler. As an alternative, you put the cheese pot in a sink of hot water.

7. Stainless steel stirring spoon or ladle.

8. Curd knife with stainless steel blade long enough to reach to the bottom of the smaller pot.

9. Cheesecloth.

10. Molds. These come in many shapes and sizes. Molds can be made by punching holes in the side and bottom of plastic cottage cheese container if necessary.

11. Cheese press. Presses are available for purchase or can be made. Blocks of wood can be placed on top of your cheese mold with heavy weight if necessary. Cider press or sausage stuffer can also be used.

HOW TO PASTEURIZE MILK

Use a double boiler to pasteurize milk. Don't heat milk directly over a burner: the milk will scorch and have a strong cooked or burned flavor and it won't clot very well.

1. Fill the bottom of double boiler with water.

2. Add milk to the stop section and cover it.

3. Heat milk to 160 degrees F, using a dairy thermometer.

4. As soon as the milk temperature reaches 160 degrees, cool it immediately by placing the top section of the double boiler in cold running water or ice water.If you plan to make cheese immediately, cook the milk to setting temperature.

STARTERS:

The two types of starters that I basically use are Mesophilic cheese starter, which is a starter used to produce sheese when the cooking temperature is 102F or lower.

The other bacterial starter culture is thermophilic which is for cheese that has a high cooking temperature such as your Italian cheese and Swiss cheese.

Other starters used are buttermilk, yogurt and lemon juice.

COAGULATION:

When milk has ripened for the proper length of time, it is necessary to add rennet to make the milk coagulate. Rennet can be purchased in tablet or liquid. I use the tablet form. Measure the right amount of rennet carefully.

IMPORTANT:

Follow your recipe carefully, so that you do not have to dump too many batches to the calves, chickens or whatever. Have a good time doing your cheese making and people love to get gifts of your cheese, so once you have mastered the art,everyone will want some of your wares.

RECIPES:

MOZZARELLA CHEESE

1 gallon whole milk

3 tablespoons buttermilk

1/4 Hanson's rennet tablet

1. Check to see that the buttermilk is an "active" brand. To one cup of whole milk at room temperature, add one tsp.buttermilk. Cover and let stand at room temperature for 12 - 18 hours until it "sets" to the consistency of custard. If it doesn't set, discard and try again with a different brand of buttermilk. If it sets, this "starter" can be used in place of the buttermilk.

2. Pour 1 gallon milk into pan and stir in 3 tbsp.buttermilk. Cover lightly and let stand at room temperature for 4 - 12 hours. Avoid direct sunlight.

3. Dissolve 1/4 Hanson's rennet tablet in 2 tbsp. of cold water. Stir with a teaspoon. Slowly raise the temperature of

milk to 88 degrees - 90F: Pour in the rennet solution slowly

as you stir the milk, and continue stirring for 1 minute.Cover the pan,remove from heat, and let stand undisturbed for 30 minutes.

4. Test the curd. It should take between 30 and 45 minutes for the rennet to curdle the milk into something like custard. To test it, put a finger into the curd at an angle and lift it out. The curd is ready to cut when it breaks clean over your figer. If it doesn't, check again every 5 minutes until it does.

5. Break up the curd. After the curd develops, break it up with your hands. Heat the curd and whey until they're as hot as your hands can stand. Then with your hands, mat the curd in the whey until it's firm.

6. Press the curd. Put the curd in your press and let the whey drain out for 20 minutes. Put the press with the curd back in the whey and heat just below boiling. Do not boil the whey. With the press still in the whey, remove the pan from the stove and let it stand until it cools. Remove the press from the whey and let it drain for 24 hours.

7. Remove the chese from the press and enjoy! It's ready for eating or use in cooking.

COLBY CHEESE

1 gallon pasteurized whole milk

4 oz Mesophilic cheese starter

1/4 rennet tablet

Heat milk to 88 to 99F. Add 4 ounches of starter and stir mixture slowly for 30 minutes.

Add 1/4 rennet tablet dissolved in 1/2 cup cold water. Mix well for 3-5 minutes.

Cover milk. Maintain temperature at 88-90F. and allow milk to set quietly until coagulation occurs.(about 30 minutes).

Cut curd into 1/4-inch cubes. Allow curds to rest for 5 minutes.

Stir curds slowly for 5 minutes.

Slowly increase temperature to 102F (2-degree increase in 5 minutes) Take about 40 minutes to reach this temperature. Maintain this temperature until the curd reaches desired frmness. Total time will be 1 1/2-2 hours.

Drain whey to the point where the curd just shows at the top of the whey. Add cool water to decrease the temperature to 90F. Stir for 20 minutes.

Remove the whey-water minture,piling the curd on the bottom of the pot. Stir curd every 10 minutes to prevent matting. Drain curd by dumping it into a colander lined with cheesecloth. Then return it to the pot and salt it.

Add 3 teaspoons of salt to the curd in three applications. Stir 5 minutes after each application.

Place curd in a cloth lined form and press overnight.

Remove cheese from press, remove the liner, and apply a larded bandage. Place the cheese in a dry, cool room.(60F)

Turn the cheese once a day to facilitate even drying. Cure this cheese for at least 2 months before you eat it. Curing should improve the flavor.

GREEK HARD CHEESE

This was a verbal recipe given to me, but I have certainly enjoyed it along with our family.

Use the whey from your previous cheese recipe. Put in pan and heat to boiling temperature. Add approximately one quart of whole cold milk. You will note when this starts to boil, turn to very low temperature and start to skim off the top foam and put in cheese cloth. Keep skimming until you cannot get any more foam. Using your hands, make a firm ball with foam inside of cheese cloth. Ball can be rolled in salt and put on a drying rack of sort in your kitchen. Keep turning this ball each day and if necessary, roll in salt as the idea is to draw out all the moisture. When this ball is completely dry, grate on your kitchen grater. This cheese will keep for every and need not be grated until ready to use.

Use this cheese as you would Romano, on your spagetti, salads or hot dishes.

SOFT GOAT CHEESE

1/2 gallon whole goat's milk to 72F. Stir in 1 ounce of mesophilic goat cheese starter culture. Place 5 tablespoons of cool water in a measuring cup. Add 1 drop liquid rennet and stir. Add 1 tablespoon of this diluted rennet to the milk. Stir thoroughly.

Cover and allow the milk to set at 72F. for 18 hours, until it coagulates.

Scoop the curd into individual goat cheese molds. These molds are gnerally food-grade plastic and measure 3 inches in height. When the molds are full they should be placed to drain in a convenient spot.

After 2 days of draining the cheese will have sunk down to abobut 1 inch in height and will maintain a firm shape. The cheese can now be eaten fresh or can be wrapped in cellophane and stored for up to two weeks in the refrigerator.

If desired the cheese may be lightly salted on its surface, immediately after being taken from the mold.

If you prefer a herbed soft goat cheese, all that it necessary is to add any herbs of your choice.

Ashfield, Ma 01330

(obtain supply catolog from this company.)

Edmund A. Zottola and Howard A. Morris, "Making Cheese at Home",University of Minnesota Bulletin.

Ricki & Robert Carroll, "Cheesemaking Made Easy", 1982 Garden Way

MINNESOTA DHI FOR GOATS

Gerald R. Steuernagel
Extension Animal Scientist - DHI Systems
Department of Animal Science
University of Minnesota

The DHI program was designed as a production testing program for dairy cattle. Since its beginning, it has developed into a dairy management tool containing information that covers many areas of production management. The principles in the DHI program are also applicable to dairy goats. In practice the Minnesota DHI computer system has been modified to process goat records with a varying degree of success.

The basic doe identification and production records are processed in accordance with all official rules. Records for all herds are sent to USDA for inclusion in the USDA's Buck Summary. Records for DHIR herds are sent to ADGA upon completion.

The Minnesota DHI reports sent to members each time the herd is tested contain a wide variety of statistics that can be used in managing the herd. These statistics become more valuable when compared with a standard. Table 1 contains the average values for all Minnesota DHI goat herds.

The Minnesota program is somewhat limited in management information for goat herds and for dairy herds under 25 or over 100 animals. Some of the more important limitations for goats are described in the following paragraphs.

The nutrition maintenance requirements are based on the weight of the animal and regression equations. The feeding recommendations in goat herds are overestimated because does are more efficient than cows. However, feed inventories and costs are properly calculated.

The Mature Equivalent production is overestimated for some does because they reach maturity faster than cows. The table values used are for Holstein dairy cows.

The program has been modified for does in the reproduction area. The estimated kidding dates are based on a 150 day gestation period. The program does not take into account that goats are seasonal breeders.

The optional somatic cell testing is available to goat herds and should be encouraged where the herd is large enough to use milking machines.

A limitation for semiannual genetic evaluation is that the USDA Buck Summary data is not included. The genetic evaluation is based on the performance of the doe and her dam.

Even with the above described limitations, the DHI management information can be useful to goat members in managing their herds.

Table 1. Minnesota DHI State Goat Averages

Number of Herds	19
Yearly Rolling Average:	
Does per herd	12
% Does in milk	77
Milk lbs	1697
% Fat	3.5
Fat lbs	59
Dry forage lbs (100% DM)	922
Hay silage lbs (100% DM)	0
Corn silage lbs (100% DM)	0
Other forage lbs (100% DM)	11
Grain lbs (100% DM)	1052
Forage DM per cwt BW	2.5
Energy index	78
Protein index	99
Milk per lb grain DM	1.6
Value of product $	392
Total feed cost $	130
Income over feed cost $	262
Feed cost per cwt milk $	7.66
Milk price per cwt $	23.10
1st Lact. vs Other Lact. Does:	
Percent of herd 1st lact.	37
Avg production index, 1st lact.	105
Avg production index, other does	97
Average age, 1st lact.	16
Average age, other does	42
% Identified by sire, 1st lact.	79
% Identified by sire, other does	93
% Leaving herd, 1st lact.	17
% Leaving herd, other does	34
Days Dry Before Kidding:	
Average days dry	86
% Dry less than 40 days*	11
% Dry more than 70 days*	44

* To calculate percents, divide the number of does in the category by all the does in the group.

Example: % dry more than 70 days = number dry > 70 divided by (number dry < 40 + number dry 40 - 70 + number dry > 70) multiplied by 100.

MARKETING

Vincent Maefsky
Poplar Hill Dairy Goat Farm

Commercial goat dairying in the United States is at best a modest industry. Many states have no licensed goat dairies; many communities have no access to pasteurized goat milk. Most dairy goat farms are small, part-time operations.

As background for the group discussion on Marketing, the following overview of present commercial marketing of dairy goat products in our five state area (Minnestoa, Wisconsin, Iowa, North Dakota and South Dakota) has been compiled.

MINNESOTA

Poplar Hill Dairy Goat Farm

Owners - Vincent and Christine Maefsky, Scandia, Minnesota

Product - Grade A pasteurized fluid goat milk sold in quart cartons. Grade A raw goat milk sold at the farm.

Market - Minneapolis, St. Paul and their suburbs. Through its distributors, milk is available in many other areas of the state.

Background - The Maefskys have been raising goats for 16 years; Poplar Hill has been a Grade A dairy marketing pasteurized goat milk for 9 years.

Raw Milk

State Law - In Minnesota, raw milk can be sold to individuals at the farm on which it is produced without inspection or licensing. Advertising the sale of raw milk is specifically prohibited by state law.

WISCONSIN

Sunshine Dairy Goat Farm

Owners - Daniel and Jane Considine, Portage, Wisconsin

Product - Grade A pasteurized fluid milk sold in quart glass bottles.

Market - The Milwaukee and Madison areas.

Background - Although Daniel Considine has had goats since his youth, it was in 1967 that he took over the Milwaukee milk market that had been established in the 1940's. At that time he also began marketing in Madison.

WISCONSIN cont'd:

Idelmar Dairy Goat Farm

Owner - Paul Ashbrook, Portage, Wisconsin

Product - Grade A pasteurized fluid milk

Market - The Chicago area

Background - In 1976 Paul Ashbrook took over the Chicago area pasteurized goat milk market from Harvey Considine. This market had been established in the 1930's by Brookhill Dairy which was both the producer and processor of the goat milk. Although the producer element of the market has changed hands over the years and is presently owned by Paul Ashbrook, Brookhill Dairy is still the processor and distributor. In addition to its own milk, Idelmar Dairy Goat Farm purchases milk from several other farms to supply this market.

National Association for Goat Producers, Inc.

Membership - David Considine, Baraboo, Wisconsin, President. As of mid July, 1984 they had 14 members. The purpose of this Association is the profitable and orderly development of markets for commercial goat products.

Product - Cheese - Their initial efforts are being devoted to the development of the use of goat milk by the domestic cheese industry. They feel the cheese market has the best potential for growth and profit.

Market - National

Background - The Association was founded in 1984. Their test market plan was scheduled to be launched by September 15, 1984 with full-scale marketing begun by January 1, 1985.

Southwest Wisconsin Dairy Goat Coop

Membership - James Johnson, Mt. Sterling, Wisconsin, Manager. This group has both member and non-member producers. The total number of producers is presently about 25.

Product - Cheese

Market - National

Background - This group was founded in 1976. It produces primarily a cheddar-type cheese sold under the name "Kickapoo". The volume of cheese produced has been on the increase in recent years. In 1980, 55,000 lbs. of cheese was produced; 75,000 lbs. in 1981, 110,000 lbs. in 1982 and 140,000 lbs. in 1983. The butterfat on incoming milk averages nearly 3.3%. For their cheddar-type cheese about 10 lbs. of milk was required to produce each pound of cheese.

WISCONSIN cont'd

Raw Milk

State law prohibits the sale of raw milk.

IOWA

Asbery Acres

Owner - Byron Porter, Dubuque, Iowa

Product - Brie cheese

Market - local with some customers as far as 200 miles away.

Background - They have been at their present location 1½ years.

Raw Milk

State law prohibits the sale of raw milk.

NORTH DAKOTA and SOUTH DAKOTA

There is no apparent Grade A fluid goat milk or goat cheese marketing activity in these states.

Raw Milk

State law prohibits the sale of raw milk.

BASIC DAIRY GOAT MANAGEMENT

Mark Boorsma
Dairy Goat Enthusiast
Chaska, Minnesota

Dairy goats are enjoying an ever-increasing popularity in the United States. As more and more families turn to goats for a home milk supply, it is important that they learn management practices which will maintain health and productivity of their animals. Sound management practices ultimately lead to greater enjoyment of goatkeeping. The areas of management we will discuss today include: housing, nutrition, reproduction, milk handling, and health.

HOUSING

The goat barn ideally should be warm and dry. Adequate ventilation is a must. In Minnesota winters, closed-up barns become very humid. Excessive humidity creates a threat of pneumonia for your goats. An exhaust fan in your barn can prevent this. It is better to sacrifice a little warmth and keep the air dry. If your barn is insulated, you will find that the goats warm the building quite well with body heat.

Your barn may be an existing structure. If other livestock have been housed in it previously, be sure to sanitize thoroughly. Goats require at least 15 sq. feet of space per animal, so determine your available space before overpopulating. Separate kidding and kid pens are highly desirable.

If you plan to build a new barn, check with other goat owners for ideas. There are sample barn plans in the USDA Extension Goat Handbook, available through your agricultural extension office (this publication contains a wealth of information on dairy goats and would be a good investment for any beginning goat owner). If you are considering a Grade A operation, it is wise to confer with the inspector before you start building.

Keep your barn well bedded with dry straw. Clean the barn completely every two or three months. Your goats will stay cleaner and you will aid in parasite control.

Insect control is essential. An electric "fly-zapper" is best, but expensive. "SurgiKill" is the brand of the unit in my barn. This should be away from feeding or milking areas. Screens on your windows will help, as will fly-strips or spray.

Outside exercise pens are a good idea, too. When planning the exercise lot, allow 25 sq. feet per animal. Use adequate fencing. This means woven wire 5 feet high, or electric fencing. Don't repeat my mistake. My first goat, a doe kid, was put in a pen with 28-inch-high chicken wire. Soon she learned to climb over this, so I used 3-foot woven wire. She still got out, so I used 4-foot, then 5-foot fencing. Of course, I was unwittingly teaching her that fences were for going over! As an adult, she was constantly getting out of her pen. It is better that they never learn these bad habits. For the same reason, always lead kids through gates; never lift them over a fence, or they learn to go over themselves.

NUTRITION

Goats are ruminants, which means that they, like cows and sheep, are constructed by nature to process large quantities of roughage. Goats tend to be picky eaters who like consistency in their diet. Establish a balanced ration for your goats and stick to it. Avoid fads and frills and don't upset their systems by changing the diet.

I still see far too many goats tethered in yards or ditches, expected to eke out an existence on grass. Goats are not lawnmowers. A mature, lactating doe would starve to death on grass. There is some food value in it, but the water content is so high as to make it impossible for her to consume as much dry matter as she needs.

Good quality second or third crop alfalfa hay is the best roughage for goats. First crop alfalfa is too stemmy and much is wasted. A mixed alfalfa and grass hay is a good roughage also. The hay should be made available to them at all times. The hay rack must be elevated; the goats will not eat hay that has fallen to the floor and been trampled underfoot. If they are forced to eat hay from the floor, the parasite problem will be heightened.

The concentrate, or grain ration, is another essential part of the balanced ration. The grain ration should contain 16 to 18% digestible protein. Purina "Goat Chow" is 16% protein. Pelleted dairy rations are available from all feed companies. If you purchase a prepared ration, be sure there is no urea or estrogen added. These additives are used for cattle but are not tolerated by goats. My own goats are fed a mixture of whole oats, cracked corn, and soybean meal. Kids receive one-half to one pound of grain per day. Lactating does are fed one-half pound of grain per pound of milk produced, such that a doe producing eight pounds of milk would get four pounds of grain. Most people find that milking time is the ideal time to feed the grain. When practical, it is best to feed the grain ration in smaller portions throughout the day (instead of all at once).

Minerals must be supplied if they are not contained in the prepared ration. While there is some difference of opinion on this, I tend to believe that the goat regulates its own intake if fed the minerals free choice. Make loose salt and minerals available to the goats. Salt blocks do NOT provide sufficient quantities. For many years I only used trace mineral and salt blocks, but the goats would try to bite off pieces of it, as licking did not provide enough. Be sure that the mineral mix fed free choice does not contain molasses, or they will eat too much of it. Too much of minerals, notably selenium, can be toxic. Use your feed dealer as a resource person for further questions about minerals or grain rations.

Clean water must be available at all times. A stock tank is one option, but for my small herd I much prefer 5-gallon pails. They are easy to clean and carry. My own goats are spoiled when it comes to watering. I have always carried warm, fresh water from the house once or twice daily. The pails are dumped out and thoroughly scrubbed before refilling. Occasionally I have added apple cider vinegar to the water. The goats think this is a special treat.

Manure should not be allowed to contaminate the goats' food. Keyhole feeders are one way of preventing this. The water must be kept manure-free as well.

REPRODUCTION

Does must be bred in order to freshen, and breeding time affords you the opportunity to improve your replacement stock. The sale of quality kids can bring you added income as well.

Does are first bred when they are seven months old. They should be at least eighty pounds when they are bred. The gestation period is 150 days, give or take five days, so the first freshener will kid at about one year of age. The young mother will continue to grow herself as she carries the kids, so ample nutrition is especially important during this time. Does not bred their first year, or dry yearlings, tend to become overweight and subsequently difficult to get bred.

Select a buck who will improve your doe's offspring. When possible, it is best to breed to proven sires - bucks whose daughters show excellence in milk production and body conformation. This most often means breeding to a buck owned by someone else. Contact the buck owner well in advance. Avoid any misunderstandings by discussing terms beforehand. Be sure to ask: what the fee is, whether health papers are required, and whether a restricted (does only) memo is involved. Be sure the buck is purebred and registered. Study his background. Milk records of his dam and granddams are important. But do not breed only by pedigrees. Examine the buck's strengths and weaknesses. If your doe has weak pasterns or close hocks, you will want to breed to a buck who has strong pasterns or straight hind legs. Develop specific goals for each mating; the more focused your goals are, the greater your chance to select wisely.

After service by the buck, pay the buck owner and be sure to get a "service memo" - a record of the breeding signed by the buck owner. You must have this document to register the kids with the American Dairy Goat Association.

Does can only be serviced while they are in "standing heat," a period of time averaging eighteen hours. Signs of heat (estrus) in the doe may include: restlessness and bleating, twitching of the tail (called "flagging"), decrease in appetite or milk production, redness and swelling around the vulva, mucus (vaginal discharge) that wets the hair around the tail and glistens on the genital area, rubbing against or fighting with other goats, mounting other goats or standing to be mounted. You should have the doe bred as soon as possible after detecting heat. The does cycle every twenty-one days.

If you do not have bucks at your farm, the heat signs may not be pronounced enough to detect. If this is the case you will want to try a "buck rag," a rag rubbed on the buck's scent glands (on the head) and on his legs (for the smell of urine). The musky-scented rag may be kept in a jar (tightly capped!) and presented daily for your does to smell. This most always will enable you to detect heat much easier.

Milking does should be dried off six to eight weeks before they are due to kid. This provides them with a rest period and diverts crucial nutrients to the fetus, now in final stages of growth and development. Milking does should be bred around the same time each year to give them complete lactation periods.

If you keep your own buck, be sure that he is worthy. Purchase a buck with

superior background. In addition to checking the pedigree, be sure to research the classification scores, milk records, and show wins of his parents and grandparents. A mediocre buck may cost less, but in the long run is no bargain for the quality of your herd. Expect to pay for quality.

"Pen breeding" means letting your buck run with the does constantly. The advantage of this method is reduced labor for you. There are numerous disadvantages, which include: not knowing when to expect kids from each individual doe, constant hassling of the does, and perhaps a "bucky" taste in your milk.

"Hand breeding" is the method I recommend. This means penning your buck separately from the does and bringing the does to him when in heat. This allows you to plot estrus cycles for each doe and plan due dates more closely. Hand breeding is absolutely essential if you plan to have your vet induce labor for better CAE control.

Once you get your does bred, record breeding date and due date. See that the pregnant doe gets adequate nutrition and exercise. Be on hand when she is due, either to assist her yourself or be able to call the veterinarian.

MILK HANDLING

Producing quality milk for human consumption requires observation of some basic rules of hygiene. Clip the doe's udder and belly to avoid long hairs getting into the milk. Always strip two streams of milk from each teat before milking, to check for lumps or blood. This also eliminates the milk with the highest concentration of bacteria. Milk into a sanitized stainless steel pail. These can be purchased with half-moon covers which further reduce the amount of debris falling into the milk.

After milking, weigh the milk and strain into glass jars. "Tropicana" orange juice bottles are especially handy, either the quart or two-quart size. They are easy to clean and sterilize for re-use again and again. Larger, gallon-sized jars are popular also, and are easier to strain into. Cool milk promptly.

All milk-handling equipment should be rinsed in warm (100^{0}) water immediately after use. Water too cool does not remove the milk fat, while water too hot would set the milk film. To sanitize before milking, use a chlorine solution.

Udders should be washed before milking. Paper towels are handiest for drying the udder. After milking, dip the teats in a disinfectant solution. Commercial preparations in easy-to-use dispenser cups may be purchased at a farm supply store. Teat dipping will effectively control many forms of mastitis.

Off-flavors in milk can be caused by many factors. Eating weeds or other strong foods will cause a noticeable change in flavor. Unsanitary milking procedures will cause foul flavors. As mentioned before, bucks run with your does may cause a "bucky" taste in the milk. Some individual does may be genetically predisposed to produce chronically off-flavored milk. If this is determined to be the case, consider culling the animal.

Yearly testing for tuberculosis and brucellosis will insure that these diseases never again are transmitted to humans via milk. TB and undulant fever once ravaged cattle, humans, and goats, but have now been virtually eradicated due

to diligent testing by dairy animal owners. Continued testing will insure the success of this effort. Testing for TB and brucellosis is also required for showing your dairy goats.

HERD HEALTH

The adage "an ounce of prevention is worth a pound of cure" is nowhere more appropriate than here. No one needs costly veterinary bills where simple precaution could have worked.

Disbud all kids. Those little horn buds might look "cute," but will grow into deadly weapons. Dehorning adults is a bloody, traumatic procedure requiring the services of your vet. Disbudding at four days of age is much simpler. Apply the hot iron for fully ten seconds to prevent scur formation later. Bucks might require a larger iron. Seek assistance from another goat owner if disbudding for the first time.

Trim hooves regularly. This means once every two months, or more often if needed.

Goats, like any other domestic animal, are prone to internal parasites. Routine worming is essential. A worming schedule suggested by Dr. Joni Scheftel, DVM, involves worming four times a year: two weeks before kidding, two weeks after kidding, late summer (August or September), and mid-winter. Rotate the type of wormer used. Commonly used products are Thiabendazole, Levamisole, Panacur, or some equine wormers. If you have coccidia in your herd, a separate treatment with CoRid is required. Always consult your veterinarian if you have questions about worming.

External parasites, notably lice, require treatment as well. Clipping all your goats each spring will help immensely in controlling lice, fleas, and mange. "CoRal" or other dusting powders will effectively eliminate these pests.

Vaccination programs should be planned with the aid of your veterinarian. I vaccinate kids for tetanus and enterotoxemia, having lost kids to both in the past. I administer tetanus antitoxin when I disbud the kids. Many Minnesota goat owners routinely administer selenium, in the form of injectable "Bo-Se."

A good veterinarian who is willing to work with goats is crucial to your health maintenance program. Unfortunately, some already-overworked large animal vets do not care to take on goats, for a number of reasons. If no other vet is available, some diplomacy and coaxing on your part may be necessary. Once you have found someone, be sure to make him or her a part of your health program before the "Emergency Situation." Always recognize your vet for the professional that he or she is. Respect your veterinarian's advice.

General cleanliness of your barn and animals will foster sound health.

May you enjoy success with your dairy goat adventures! Do seek out fellow goat owners for advice, assistance, and camaraderie. Join the Minnesota Dairy Goat Association and get involved with your local club. Most of all, enjoy your goats. They are productive, personable, and devoted companions.

BEGINNERS BASIC MANAGEMENT OF DAIRY GOATS

Maxine Sheldon
Maple Island Alpines

Housing, feeding, health management, milk handling and your breeding program are the areas which I will be discussing. All of these areas are important for a successful management program.

HOUSING

In our climate, we must provide duel purpose housing that will keep the goats warm in the winter and cool in the summer. A building that is double-walled and insulated is ideal. This could be either a new structure or an adapted farm building already in existence. If an older barn, hog house or chicken coop is to be used, diligent cleaning and sanitizing should be completed before the goats are housed in them. If you are building a new building, the University has building plans for calf barns that work very well for dairy goats. Each goat should have a minimum of fifteen square feet of space. Plan generously. Goat herds have a tendency to grow quickly!

Ventilation is a major concern. Not only will you need windows that are functional and provide good cross-ventilation, you will need a ventilation fan. Excessive humidity, not temperature control, is the biggest problem. Goats can tolerate cold temperatures, but not high humidity.

Along with dry air, the goats need a dry floor that is well-bedded and warm. Gravel flooring in loose housing pens works very well. With the use of adequate bedding it will be necessary to completely clean the barn about four times per year.

Insect control, mainly flies, is also important. The windows should be screened and the barn kept clean. You will still need help from fly strips and dairy sprays. Mosquitoes also like the taste of goats, and must be controlled.

Keeping goats confined does not have to be a hassle. A majority of our fencing is electric. We also use some hog panels. For our bucks we use woven wire with one strand of electric on the inside. The one strand of electric keeps the bucks from rubbing on the fence and stretcing the fence out of shape. We have found that keeping our goats well fed with adequate exercise area prevents them from wanting to get out. We also do not teach our kids how to jump or come over the fence. We always walk them through a gate instead of lifting them over the fence. Another thing to keep in mind when fencing is not only keeping your goats in, but keeping out unwanted preditors. Strange dogs in goat pens are deadly.

FEEDING

Most important is getting on a good feeding program and being consistent. Talking to your extension agent will help you determine what dairy farmers in your area are feeding their cows, and where they are getting their feed. A good 16% protein dairy ration should be adequate. Most feed mills have a dairy ration available. There are also some commercial dairy goat rations on the market. If you use a cow feed, be sure it does not contain urea or estrogen. Goats do not tolerate these additives. We use a 14% or 20% protein pelleted dairy ration marketed by the Doboy feed company. The protein varies depending on the quality of the forage we are feeding. This has worked the best for us and is the most economical way for us to feed grain. We feed about four pounds of grain per goat per day for eight pounds of milk. We increase that according to the individual goat's production. One pound of grain for two pounds of milk. A doe milking sixteen pounds per day would get eight pounds of grain. During the dry period we feed less than four pounds if the does are getting too fat.

Along with our pelleted grain our goats have alfalfa hay available to them at all times. A good quality dairy hay is best. Grass hay with many weeds and coarse stems is not as palatible for the goats and strong weeds make strong tasting milk. Loose salt and minerals should also be available at all times. Your feed person would be the best person to advise you on what minerals to use with your particular hay and grain.

Grain and hay should be fed in feeders off the floor, with both being non-accessible for playing or sleeping. Manure droppings should also be kept out. Clean water should be available at all times, and if possible it should be warm, summer and winter.

HEALTH MAINTENANCE

Prevention is much easier and cheaper than curing. To accomplish this there are some routine management procedures that should always be done.

Hoof trimming is one of them. This should be done as needed, which turns out to be about every two months. Some goats hooves grow faster than others and will need to be done more frequently.

All kids should be disbudded at four to five days of age if they are horned. If you have adults with horns, they can be dehorned when there are no flies, but you should have some help from your veterinarian when doing this.

Routine worming should be done at least twice yearly. This should be done before breeding season in the fall, and after kidding in the spring. It is better to rotate worming medication, not using the same wormer twice in a row. Thibenzole and Panacur are very effective. If you have coccidia in your herd, a wormer for that specifically must be used. Keeping hay, grain and water feces free, and keeping your barn clean is also important for controlling parasites.

You should also check for external parasites and treat as necessary. If your animals are rubbing and scratching excessively, loosing their hair or have dull coats, they may have lice, fleas or mange. If these goats are in milk, make sure you use a treatment that is for dairy animals. Clipping your goats in the spring will help you to evaluate their skin condition more accurately.

Vaccinations should be discussed with your veterinarian and given as he suggests. He will be aware of the health problems you are having and the health problems in your area. We vaccinate yearly for enterotoxemia and tetanus. Tetanus is especially important if you have horses, or if there has ever been horses on your farm.

Another thing that should be done annually is testing for tuberculosis and brucellosis (bangs), particularly if you drink you milk unpasteurized.

When you are planning your housing, you should include an area where you can isolate an animal if it is sick or injured. It is also a good idea to isolate any new animal that is coming into your herd for a minimum of thirty days.

An important part of health careis finding a good veterinarian before you have a sick animal. Get to know him and give him a chance to get to know your animals before you have to call him in an emergency.

MILK HANDLING

Milk is one of the rewards for the hard work with your goats. Taking care of the milk properly is of utmost importance to insure a quality product for human consumption.

A separate, clean room for milking is needed. A cement floor is preferred, with an elevated milking stand, and a shelf for milking utensils during milking. The doe should have a dairy clip including her flanks, tail, udder and underneath her belly. The entire animal should be brushed to remove loose hair and dirt from her coat. Just prior to milking all equipment that touches the milk should be sanitized in a water/chlorox solution and allowed to drain and air dry.

The doe's udder and teats should be washed with warm water containing an udder wash solution like chlorahexidine. Next dry the doe with a paper towel. Leave the paper towel under the doe and use it for a blotter for milk splashes. After the doe is dried with the paper towel, strip two squirts of milk from each teat into the strip cup to check for blood spots or milk clogs. This also removes the milk with the most bacteria from the teat. Proceed to milk the doe into a stainless steel pail. If a stainless steel goat milking pail is not available, any stainless steel mixing bowl or pan will suffice. When

you have emptied the udder,massage it for a few seconds to work down any milk that was high up in the udder. After the massage, milk the udder empty again. Next dip both teats in teat dip to seal the teat orifaces. The milk should then be strained into a glass jar and cooled immediately. Submerging the jar in ice water cools the milk faster than just setting it in the refrigerator. When you have finished milking, the equipment should be rinsed in tepid water, then washed in a dairy detergent and again sanitized in the water/chlorox solution and allowed to air dry. A brush works best for washing the utensils. The milk stand should be wiped off and the floor swept after milking.

BREEDING PROGRAM

A successful breeding program is vitally important because it determines the type of animals that will be in your herd in the future. Each mating should have a purpose other than getting the doe bred to bring her into milk. A successful breeding is one in which the offspring is an improvement over the dam.

If you are planning to purchase buck service from another breeder, make the arrangements prior to the day you would like your doe serviced. Be prepared to meet the requirements of the breeder such as health certificates and time of day that is best for them. Discuss the cost of the service and be prepared to pay cash at the time of servicing. After the servicing is completed be sure to get a signed Sire Service Memo fro the breeder for use in registering your kids when they are born.

There is nothing more difficult in the breeding process than determining for sure that the doe is in standing heat. The signs are red, swollen vulva, clear vaginal discharge, "flagging"with the tail, more talkative with a change in disposition. Milkers may have a reduction in production when they are in heat. Heat cycles last from twelve to twenty-four hours to two or three days. Every doe is an individual. The cycles should occur about every twenty-one days. If you are having difficulty indetecting heat, a buck rag may be helpful. The best time for catching does in heat is usally October or November, but some will breed as early as August or as late as January.

Doe kids may be bred when they are seven months old and weigh a minimum of eighty-five pounds. Does in milk should be bred to freshen about the same time every year. They should have a two month rest from milking after their ten month lactation, before freshening again. You will need to start drying them up at least eight weeks before they are due to kid.

When your does are bred, they will need adequate exercise and should be protected from over-crowding and stressful situations. When the due date arrives, be sure to be on hand for the kidding. If you are unable to be there, at least arrange to have the doe checked on two or three times a day. Does usually kid within five days before or after their due date. After the doe has freshened, she should not be milked empty for the first twenty-four hours. Just keep the udder milked enough to keep the pressure off and the doe comfortable. After the first day, the doe should be milked twice a day at regular twelve hour intervals.

Kids should remain on milk along with grain, hay and water until they are three months old. Bottle feeding or pail feedings will need to be done three times per day for the first month, then a twice a day schedule may be implemented. Separate housing is most desirable for the kids until they are large enough to compete with mature animals. Buck and doe kids should be separated by three months of age or breedings may occur.

Last but not least, take time out to enjoy you goats. Goats are devoted and loving animals that will give you many years of service for the price of some common sense and lots of TLC.

SOURCES OF INFORMATION ON DAIRY GOATS

By: R.D. Appleman, Extension Dairyman, University of Minnesota

LEAFLETS, CIRCULARS, AND BULLETINS

A. Dairy Goat Management and Production

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   L.R. Brown, Department of Animal Industries, University of Connecticut, Stoors, Connecticut 06268; and B. Harris and R.L. Richter, Dairy Science Department, Gainesville, Florida 32611 (1975) -- 18 pages.

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   G.F.W. Haenlein, Department of Animal Science and Agricultural Biochemistry, University of Delaware, Newark, Delaware 19711, Journal of Dairy Science, Vol. 61, No. 7, (July 1978) -- 1011-1022.

3. The Dairy Goat, Information Bulletin 78
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5. Dairy Goat Care and Management
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   B.E. Colby, D.A. Evans, S.L. Lyford, W.B. Nutting, and D.W. Stearn. University of Massachusetts. Available from American Dairy Goat Association, Box 865, Spindale, N.C. 28160 -- 78 pages.

B. Dairy Goat Genetics

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C. Dairy Goat Reproduction & Breeding

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ORGANIZATIONS AND SUPPLIERS

A. Dairy Goat Associations

1. The American Dairy Goat Association
Don Wilson, Secretary Treasurer, Box 865, Spindale, North Carolina 28160.

2. The American Society
H.Wayne Hamrick, Secretary, Route 2, Box 112, DeLeon, Texas 76444.

3. Dairy Goat Club Directory is published annually in the February issue of the "Dairy Goat Journal."

B. National Dairy Goat Breed Associations

1. Alpine International Club
Yvonne Roberts, Secretary-Treasurer, Rt. 1, Box 3065, Ft. Pierre, FL 33451.

2. American LaMancha Club
Mrs. Virginia Marhefka, Secretary-Treasurer, Star Route 1, Box 573, Chino Valley, AZ 86323.

3. International Nubian Breeders Association
Mrs. Linda Brake, Secretary-Treasurer, 5225 East Pershing Avenue, Scottsdale, Arizona 85254.

4. National Saanen Breeders Association
Mrs. Minnie Waterman, Secretary-Treasurer, RFD 2, Kerr Road, Canterbury, Connecticut 06331.

5. National Toggenburg Club
Joan Kilhem, Secretary-Treasurer, Chestnut Hill Rd., E. Hampton, CT 06424.

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Judy Marshall, Secretary-Treasurer, 1929 Centerville Turnpike, Virginia Beach, VA 23464.

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D. Dairy Goat Equipment Suppliers

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2. American Supply House
   P. O. Box 114, Columbia, Missouri 65201

3. Hoegger's Supply Company
   P. O. Box 490232, "Dept. J," College Park, Georgia 30349.

4. Goat Gifts Galore (Thomas E. Hicks)
   P.O. Box 284, Clearwater, MN 55320 (612) 558-2280

5. Caprine Supply
   6657 Woodland, Shawnee, KS 66218 (913) 441-1848

E. Minnesota Dairy Goat Association Chapters

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Rt. 1 Box 117
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218-715-8154

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Superior, Wisconsin 54880
715-399-8477

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Route 3 Box 17
Austin, Minn. 55912
507-433-5698

Three Rivers Dairy Goat Club
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Rt. 3 Box 376A
Zimmerman, Minn. 55398

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New Prague, Minn. 56071
612-758-4602

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13995 220th Street East
Hastings, Minn. 55033
612-437-8761